From:	Carolyn Lauron
To:	Justin Hawkins
Cc:	Demetrius Murray; Greg Cranston; Andrew Brenner; Michael Dudek
Subject:	NRC Staff Responses to Clarification Questions regarding Containment Stress Limits (SRP 3.9.3)
Date:	Friday, October 21, 2022 1:20:00 PM

Hi Justin –

Below are the NRC staff's responses to the questions on Containment Stress Limits.

Please let us know if you have additional questions or need more information.

Thank you,
Carolyn Lauron
USNRC

Question:

Request for clarifications regarding load combination and stress limit exceptions for the SMR-160 containment structure (CS). Specifically:

1. In RG 1.57 (which provides design limits and load combinations for metal containments) loss of coolant/pipe break accidents combined with a Safe Shutdown Earthquake (SSE) are listed under Service Level (SL) C events. In NUREG-0800 SRP 3.9.3 (for ASME Code Class 1 components such as reactor pressure vessel) the same accident combination, as above, is listed under SL D events.

   Why the difference (Service Level D and Service Level C)?
   Can a metal containment use/apply SL D vs SL C for this accident combination?

NRC Staff Response:

The NRC encourages an applicant to use a white paper to identify any consensus codes and standards or code cases they intend to use and specifically identify any standards or code cases that have not been endorsed or previously accepted by the NRC staff. For any such standards or code cases, the applicant should engage in pre-application discussions to identify any areas where additional information may be needed in the application to support the proposed approach.

The NRC guidance in RG 1.57 and SRP 3.9.3 provide different design limits and load combinations commensurate with the function of the components and structures of concern. The use of the NRC guidance is one acceptable way of meeting the regulations. An applicant may choose to use the guidance as provided in the RG and SRP or propose a different approach with justification on how it meets the applicable regulations, noting that there are differences in applicable regulations for metal containments and ASME Class 1 components.

The guidance in RG 1.57 provides design limits and load combinations applicable to metal reactor containment structure that is required to be the last and essentially leak-tight barrier against the uncontrolled release of radiation resulting from any loss-of-coolant accident (which typically involve a breach of the reactor coolant pressure boundary components, i.e., breach of ASME Class 1 components may occur; however, containment is required by regulations to accommodate accident conditions without exceeding design leakage rate and with sufficient margin). The service loadings (levels A, B, C, D) criteria and service limits specified in RG 1.57 applicable to metal containments (MC) are consistent with the requirements in paragraph NE-3113 of Subsection NE of the ASME Code, Section III, Division 1, which is incorporated by reference in 10 CFR 50.55a. The NRC staff will review metal containments (MC) in accordance with NUREG-0800 Standard Review Plan (SRP) Section 3.8.2 (ML100630179). The applicable regulatory requirements, applicable codes and standards and regulatory guidance, and acceptance criteria for metal containments, and the NRC staff's technical rationale for the guidance are discussed within these guidance documents. The guidance in the SRP, and related regulatory guidance documents are not mandatory requirements (except where guidance provided is explicitly required by regulation) but provide for one acceptable way or approach to meet the regulatory requirements. Applicants may propose alternative ways to comply with the regulations for their designs provided they are supported by sufficient justification.

As an example, in the NuScale standard design, the applicant used a combination of ASME Section III, Division 1, Subsections NB and NE, as incorporated by reference in 10 CFR 50.55a, and with conformance with the guidance in RG 1.57 for design, construction and stamping of the NuScale metal containment. The NRC staff notes that there are differences in the regulatory requirements (or principal design criteria) between containments and Class 1 components based on their intended design function.

Question:

2. There are several differences between the stress limits under various SLs provided in ASME Code Subsection NE for metal containments vs. ASME Code Subsection NB for Class 1 vessels.

   Specifically, stress limits per Subsection NE for SLs B and D are, in general, lower than those in Subsection NB with a maximum difference of 10% for SL B and 15% for SL D depending on the material. In some cases, Subsection NE SL D limits are identical to SL C limits, but the loads are significantly greater. This is because of the 0.85 factor applied on the Mandatory Appendix XXVII SL D stress limit per Subsection NE.

   Can a metal containment use/apply the SL B and D stress limits in Subsection NB instead of Subsection NE?

NRC Staff Response:

The NRC staff notes this question is more appropriately addressed through an inquiry to the ASME Section III Standards Committee. As noted in the previous response, an applicant may propose different stress limits other than those specified in ASME, Section III, Subsection NE, for metal containments with adequate justification.